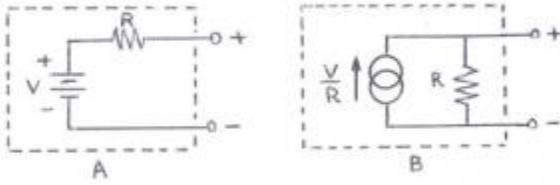


Circuit Challenge 1

Consider the two circuits (A & B) shown below.



The Situation

You are (hypothetically) an employee of XYZ, Inc. Your company has been awarded a huge contract to supply identical control systems for the top 10 automakers in the world (yes, *all* 10). Interestingly, the control system must be constructed using Circuit A or Circuit B. Either one will work, but in the interest of standardizing the overall system your management has publically stated that only one would be selected. The selected circuit will be sub-contracted to Supplier A (if A is chosen) or to Supplier B (if B is chosen).

Your team has evaluated both modules and has made its choice. The winning design will be announced publicly in one-half hour. In preparation for this announcement each design has been placed in its own sealed container (only the terminals are accessible). These containers are locked. Your CEO has the keys. By pre-arrangement you will bring the two modules into an auditorium, the CEO will hand you a key, and you will unlock the winning circuit.

You go over to the auditorium and see that the media have arrived, and are setting up. Representatives of Supplier A and Supplier B are filtering in. Your manager, her manager, some corporate VPs, the CEO, and several members of XYZ's board of directors are already in attendance. Refreshments are being served.

You return to the lab to place Module A and Module B on a cart for transport to the auditorium. As it happens, someone has turned on a fan in the lab. Modules A & B are on your bench, but the cards that identify A & B have blown off onto the floor. There is no other marking on the sealed containers. You have about 20 minutes to identify which is which. With a growing sense of uneasiness (and knowing what you will find) you measure the open-circuit voltages. Identical. You measure the short-circuit currents. Identical. You measure the output impedances. Identical. The containers are identical in construction, and even weigh the same. Your lab is equipped with an X-ray apparatus, but the modules are impervious to X-ray examination. The implications of opening the wrong container in the auditorium cause you great anxiety. Frantically, and with only a few minutes before you must appear in the auditorium, you begin looking for something, anything (!), that will help you determine which container is A, and which is B. You consider breaking open one of the modules, but the phone rings. It's time. You place the modules on the cart. You are just about to leave the lab when you realize there *is* a definitive method for identifying A and B [one that requires only a simple measurement (there is no need to unlock or break open either container)].

What is that method? Think about it, then scroll down to find out.

Analysis for Challenge 1

Which is A and which is B became apparent when you placed the containers on the cart: Container B is warm because it has power dissipation.